EXHIBIT 11

CHAPTER 6

ASSESSMENT OF COGNITION IN AFRICAN AMERICAN OLDER ADULTS

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Epidemiological studies of older adults have shown higher prevalence and incidence of dementia and Alzheimer's disease (AD) in African Americans than in non-Hispanic Whites (hereinafter referred to simply as *Whites*; Demirovic et al., 2003; Husaini et al., 2003; Krishnan et al., 2005; Mayeda, Glymour, Quesenberry, & Whitmer, 2016; Mehta & Yeo, 2017; Potter et al., 2009; Tang et al., 2001; Zhang, Hayward, & Yu, 2016). Potential biological, socioeconomic, behavioral, and psychosocial causes of this disparity have been investigated (Barnes et al., 2015; Gottesman et al., 2016; Hohman et al., 2016; Sisco et al., 2014; Yaffe et al., 2013; Zhang et al., 2016). Yet, potential cultural bias in the neuropsychological and functional measures used for diagnosing dementia among African American and White older adults has been observed (Manly, Jacobs, et al., 1998; Rexroth et al., 2013; Snitz et al., 2009), which raises the possibility that the observed differences in rates of dementia reflect assessment bias rather than true disparities. Most previous studies of ethnic group differences in performance on neuropsychological tests have shown that discrepancies between scores of different ethnic groups persist, despite equating groups on other demographic covariates such as age, education, gender, socioeconomic background, and medical history such as cardiovascular and cerebrovascular disease. These discrepancies cause attenuated specificity of verbal and nonverbal neuropsychological tests, such that cognitively normal ethnic minorities are more likely to be misdiagnosed as impaired as than are Whites (Campbell et al., 2002; Ford-Booker et al., 1993; Manly, Jacobs, et al., 1998; Welsh et al., 1995). Poor specificity may have serious consequences for accurate diagnosis, recognition, and treatment of dementia among African American elderly individuals.

Researchers and clinicians using neuropsychological and functional measures to detect dementia often assume that test scores provide valid indicators of ability regardless of cultural background (Nell, 2000). However, impaired performance on a cognitive or functional measure may not reflect the same underlying construct between groups of people. Attempts to develop ways to measure and appropriately account for social and cultural differences in neuropsychological testing remain elusive, although efforts are ongoing (Elbulok-Charcape, Rabin, Spadaccini, & Barr, 2014; Manly, Touradji, Tang, & Stern, 2003; Sisco et al., 2014; Uzzell, Ponton, & Ardila, 2013). Many researchers have moved to establish separate normative standards for cognitive and functional measures for African Americans (Lucas et al., 2005; Manly et al., 2005), which may reduce misclassification and misdiagnosis. However, variability in geographic, educational, social, and cultural experiences within race may decrease the utility of these norms when used for individuals who were not represented in the normative sample. Most normative samples that are nationally representative, even when African Americans are oversampled, do not provide the sample size needed to analyze the effects of race, region, education, and other demographic characteristics on test performance. Despite the potential practical utility of separate norms, this approach does

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not address the variability related to culture, race, literacy, region, and education that likely underlies ethnic group differences on cognitive and functional measures. Norms may thus become quickly outdated because these factors, and the interaction between these factors, change over time. Exclusive reliance on separate cognitive and functional norms for African Americans may lead to increased misunderstanding of racial and ethnic group differences, and could become unwieldy for the everyday practitioner. How should clinicians and researchers decide which instruments and which norms to use among African Americans to improve diagnostic accuracy for cognitive impairment and dementia?

Although there are no simple solutions, there are common elements to the practice of clinicians and researchers who are carrying out ethical and accurate neuropsychological assessment of African American older adults. The goal of this chapter is to raise awareness of those elements common to success and to summarize best practices for the neuropsychological assessment of older African Americans. In this chapter, we first review challenges to dementia assessment of African American older adults, including issues related to reliability and validity of measures and normative standards. The sociocultural context and life course experiences of African American older adults and their relationship to assessment of cognitive and functional decline are reviewed, including experiences of discrimination, acculturation, quality of educational background, under- and misdiagnosis of co-occurring medical and psychiatric conditions, relationships with collateral sources of information, and environmental influences on the aging process. We then recommend best practices for assessment given these challenges and consider how race should be contextualized within dementia assessment of African American older adults.

CHALLENGES TO NEUROPSYCHOLOGICAL ASSESSMENT OF AFRICAN AMERICAN OLDER ADULTS

Several challenges face neuropsychologists undertaking neuropsychological assessment among older African Americans. However, many of these hurdles provide opportunities to address gaps in understanding of mechanisms for disparities in later life cognitive function.

Test Bias

Test bias may affect scores of African American older adults on tests used to detect cognitive impairment associated with dementia. Racial differences in mean cognitive test scores across racial groups do not necessarily indicate that tests are biased against ethnic minorities. For the same reason, separate group norms will not resolve problems with accuracy of detection of impairment among minority groups if the underlying cause includes measurement bias.

Traditionally, *test bias* refers to racial differences in accuracy of predictions of outcomes based on test scores. Using this definition, most previous research has shown that despite lower overall performance on cognitive tasks, prediction of outcomes is the same across racial/ethnic groups. For example, the relationship between SAT scores and 1st-year college grades is the same among African American and White students, and the Stanford-Binet–derived IQ score predicts success in elementary school and educational attainment equally across race (Kaplan, 1985). In other words, because the prediction is equally accurate in both groups, the tests do not fit the traditional definition of bias.

This definition of bias ignores construct validity and cultural equivalence of the tests. Because the predictor and the criterion may be similarly biased, the question of whether the tests tap the same abilities in the same way across cultures is not addressed. For example, if discrimination affects performance on cognitive tests and discrimination similarly affects outcomes such as educational achievement, grades, and school success, one would expect that the prediction across cultural groups would be similar even if the tests do not have cultural equivalence across racial groups. Focus on prediction of outcomes also ignores the possibility that there may be noncognitive factors that affect test performance among culturally different groups.

Modern psychometric methods such as item response theory, differential item functioning, and invariance analysis using structural equation

modeling can help detect test bias across racial/ethnic groups (Pedraza & Mungas, 2008). Most research on neuropsychological tests using these methods has shown that even if individual items are biased, these biases are not serious enough to account for racial differences on cognitive test scores (Aiken Morgan et al., 2010; Fyffe et al., 2011). However, some research has suggested that items on measures such as the Boston Naming Test are racially biased and thus scores on these measures should not be compared across groups (Pedraza et al., 2009).

Normative Standards

Change in cognitive functioning in older adults is clinically most relevant when it affects their ability to engage in everyday activities and behaviors and causes decline in functioning from a previous level. Ideally, to determine cognitive impairment and diagnose dementia, one would compare current cognitive ability with the premorbid level of the individual being tested. Because those data rarely exist, as a best estimate neuropsychologists use comparison groups of similarly situated people who are currently performing everyday tasks without limitations, problems, or disability. Traditionally, similarity has been operationalized as age, sex, and years of education.

This traditional approach has three main limitations: (a) poor measurement or residual confounding, (b) lack of consideration and inclusion of important demographic factors that may improve diagnostic accuracy, and (c) secular changes or trends over time in demographic characteristics of the population, in racial identification, or in the impact of demographic variables on cognitive performance.

First, if demographic variables are measured with error, if normative samples are small and nonrepresentative, or if the variables considered do not measure the underlying construct in an equivalent way across racial groups, there may be residual confounds, and thus the capacity of norms to improve diagnostic accuracy will be reduced. One clear example of this will be discussed in more detail below: Differences in educational experience persist despite adjustment for years of education across racial groups as a result of school segregation and other educational disparities between African Americans and Whites.

Second, unmeasured or unconsidered demographic factors may influence test performance, and failure to adjust for these factors decreases diagnostic accuracy. An excellent example is that although most norms adjust only for age, sex, and years of school, additional consideration of the examinee's race/ethnicity would dramatically improve specificity of the test when used among ethnic minorities (Manly, 2005). Many other social, political, or cultural differences between groups of people might also be background characteristics for which adjustments could be considered. For instance, differences based on geographic region, culture, language, economic status, neighborhood conditions, migration or immigration status have all been shown to be significantly related to performance on cognitive tests (Fletcher-Janzen, Strickland, & Reynolds, 2000; Rhodes, Ochoa, & Ortiz, 2005; Uzzell et al., 2013), but few, if any, test norms are available for these characteristics. Because the number of demographic characteristics that could be considered when comparing people is vast, it is impractical to consider every variable in every population. The statistical and psychometric challenges to adjusting for large numbers of demographic variables are readily apparent because of the risk of so few people populating each subgroup within a normative sample. Although it is impractical to require all potential background characteristics to be included in normative studies, research that identifies which factors are most salient to each cognitive domain is lacking. Use of local norms usually addresses these issues, but many clinicians and researchers do not have the resources to collect a sufficient normative sample in their area and must rely on national norms or norms collected at the convenience of test developers.

Third, race and ethnicity groupings are based on social norms, are not stable or impermeable, and may be fluid over time and place. For example, as a group African Americans combine many cultures, languages, religions, geography, political and historical divisions, nationalities, and educational experiences, which may be more dissimilar than similar, and yet they get grouped into a single racial category.

Application of norms for African Americans must always take into account the background of the people included in the normative cohort, including residential history, where schooling took place, life course, socioeconomic status, nationality, and language use history. Racial and ethnic classifications are becoming more blurred over time as the U.S. population becomes increasingly multiracial. Demographic adjustments that include only people of one specific racial or ethnic background may not be appropriate for biracial or multiracial people.

Generational shifts should be a major consideration in development and use of neuropsychological test norms, especially for older African Americans for whom social conditions and occupational and educational opportunities have changed markedly over the past century (Goldin & Katz, 2009). For example, the national average of years of school completed among African Americans who were age 65 years and older in 2005 (when the Mayo Older African Americans Normative Study [Lucas et al., 2005] was published) was 10.3 years (Snyder, 1993). In 2017, the national average of years of school completed among African Americans who are age 65 years and older is 12.7 years. This significant change in educational attainment likely represents the significant changes caused by compulsory school laws, but it also represents changes in other educational opportunities, social position of families, and occupational opportunities for African Americans. Therefore, the assumptions that are built into demographic adjustments may become rapidly outdated because of historical changes in opportunities and resources available for educational attainment and other social conditions.

A key issue with respect to the use of demographic adjustments among African American older adults is that they are not appropriate when the question is descriptive (e.g., estimation of intellectual function, comparison with grade-matched peers, or determination of everyday functioning; Barrash et al., 2010; Higginson, Lanni, Sigvardt, & Disbrow, 2013; Silverberg & Millis, 2009). However, demographic norms for African Americans are an important tool when the question is diagnostic, and when the normative cohort includes a sufficient number of people with the same background (including birth year) as the examinee, because their use improves the specificity of detection of subtle cognitive impairment.

Selection Bias

Differences in the way in which African Americans and Whites are recruited into research studies on cognitive aging and dementia, including cohorts used to establish neuropsychological norms for individual tests and batteries, may lead to nongeneralizable results. Barriers to research participation among older African Americans have been detailed in prior publications (Barnes & Bennett, 2014; Lambe, Cantwell, Islam, Horvath, & Jefferson, 2011). Efforts of researchers to overcome these barriers may influence sample characteristics and bias results. This can also happen when norms are collected in an area in which a trusting relationship does not exist between the minority community and the research institution. Recruitment of participants for a normative sample, while meeting goals for numbers of people within multiple race–age–sex–education cells, can be difficult and take many years. To recruit enough people to stratify by a number of demographic characteristics (i.e., fill cells), researchers often recruit people who are unusual or atypical for their background. For example, because many barriers to recruitment of African Americans are related to other background characteristics such as wealth and education, African Americans who are ultimately enrolled in neuropsychological research may have more years of school or higher income than African Americans in the general population. Outreach efforts may target African Americans when they attend community, religious, or social events, which could result in a relative overrepresentation of African Americans with stronger social connections. Researcher assumptions about work and retirement age are also likely to affect participation in normative studies; gaps in wealth result in a worse financial outlook for retirement for African Americans than for Whites (McKernan, Ratcliffe, Steuerle, Kalish, & Quakenbush, 2017), and thus older African Americans are more likely to continue to work after retirement age. Therefore, if participation in normative studies

requires availability to be tested on weekdays from 9:00 a.m. to 5:00 p.m., the people included may be less representative than the population of healthy people within this age range.

Research has documented that compared with Whites, racial and ethnic minorities are less likely to present to memory disorder clinics, are less likely to be referred for a dementia assessment, and are more likely to be diagnosed at later stages of dementia (Dilworth-Anderson, Pierre, & Hilliard, 2012). African Americans who do present to clinics are more likely to have neuropsychiatric symptoms than Whites (Sink, Covinsky, Newcomer, & Yaffe, 2004). It is possible that these known differences in recognition of dementia, referral, and diagnosis can help explain the finding that, at death, African Americans who were diagnosed with AD in life are more likely to have mixed brain pathology (including Alzheimer pathology, Lewy bodies, and infarcts) than Whites who were diagnosed with AD in life (Barnes et al., 2015). Average per-person Medicare payments are 45% higher for African Americans with a dementia diagnosis than for Whites with dementia (Alzheimer's Association, 2011); this disparity may also be explained by racial differences in recognition of impairment, access to health care, referral, and diagnosis.

This is also a critical issue for enrollment in clinical studies for prevention or treatment of neurodegenerative diseases of aging. Numerous studies have examined a lack of ethnic and racial diversity in clinical trials, some of the reasons for it, and potential approaches to overcome barriers to more representative trials (Ford et al., 2008; George, Duran, & Norris, 2014; Heller et al., 2014; Ibrahim & Sidani, 2014). For African Americans, mistrust of researchers based on past personal or historical experience of discrimination and racism remains a crucial barrier to participation in clinical trials (Braunstein, Sherber, Schulman, Ding, & Powe, 2008; Corbie-Smith, Thomas, & St. George, 2002; Ejiogu et al., 2011; Huang & Coker, 2010; Moreno-John et al., 2004; Scharff et al., 2010). In addition, the time and cost of participation (time off from work, travel to and from clinic locations, access to transportation), co-occurring medical or health problems, inadequate information about the research or medical need, and the inability of many academic research centers to engage African American communities for research recruitment and to convey trial information all continue to limit the participation of African American community members in clinical trials (Ejiogu et al., 2011). These barriers lead to meaningful differences between African Americans who come to clinics, for research or assessment, and the community in general (Brodaty et al., 2014; Glymour & Manly, 2008; Halbert et al., 2010; Schneider, Aggarwal, Barnes, Boyle, & Bennett, 2009).

Experiences of Discrimination, Racial Socialization, and Acculturation

Personal experiences of discrimination and racism, as well as knowledge of historic cultural and institutional racism, pose strong challenges not only to recruitment but also to identification and treatment of older African Americans with cognitive impairment (Scharff et al., 2010). Efforts to understand the consequences of these experiences for health care utilization and outcomes have focused on a number of consequences: limited access and mobility resulting from current or historic segregation, increased allostatic load from heightened stress, mistrust of researchers and government officials resulting from institutional racism, under- and misdiagnosis of medical and psychological conditions, and clinician racism and bias (Hankerson, Suite, & Bailey, 2015; Hohman et al., 2016; Neighbors, Trierweiler, Ford, & Muroff, 2003; Suite, La Bril, Primm, & Harrison-Ross, 2007; Williams, Neighbors, & Jackson, 2003).

Perceptions of discrimination have negative consequences for cognitive performance in adolescence and older age (Barnes et al., 2012; Chavous, Rivas-Drake, Smalls, Griffin, & Cogburn, 2008; Thompson & Gregory, 2011; Wong, Eccles, & Sameroff, 2003). For instance, among African Americans, expectations and experiences of discrimination can reduce cognitive test performance by diverting attention from the task at hand to the concern that one's performance will confirm a negative stereotype about one's group (Steele, 1997; Steele & Aronson, 1995). One proposed mechanism for the decreased performance on cognitive tests is depletion of executive functioning resources (Johns, Inzlicht, & Schmader, 2008). In

African American older adults who reported more lifetime experiences of discrimination, scores were lower on cognitive measures; this effect was mediated by level of depressive symptoms (Barnes et al., 2012). Because of limited research on the topic, the role of stereotype threat in the neuropsychological assessment of older African Americans is unknown. Perceived lifetime and everyday discrimination should be included in the neuropsychological assessment of older African Americans as a factor that may directly (through stereotype threat) or indirectly (through stress or depressed mood) affect performance on cognitive tests.

In addition, acculturation may be related to neuropsychological test score among African Americans. Acculturation is defined as the level at which an individual participates in the values, language, and practices of his or her own ethnic community versus those of the dominant culture (Landrine & Klonoff, 1996; Padilla, 1980). Previous studies have identified ideologies, beliefs, expectations, and attitudes as relevant components of acculturation, as well as cognitive and behavioral characteristics such as language and customs (Berry, 1976; Moyerman & Forman, 1992; Negy & Woods, 1992; Padilla, 1980). Prior research has suggested that African American individuals whose background and experiences are more similar to the culture in which the tests were developed and normed (i.e., who are more acculturated) obtain higher test scores on both verbal and nonverbal tests than individuals whose cultural experiences are less mainstream and bound to their own ethnic culture (i.e., who are less acculturated; Boone, Victor, Wen, Razani, & Pontón, 2007; Kennepohl, 2003; Lucas, 1998; Manly, Byrd, Touradji, & Stern, 2004; Manly, Miller, et al., 1998). This work suggests that acculturation level, as a construct distinct from race and perceived discrimination, should be measured and considered in the neuropsychological assessment of older African Americans.

Impact of Medical and Psychiatric Conditions

Disparities in medical and psychological outcomes by demographic characteristics such as race and ethnicity are well established (Bach et al., 2002; Cooper, Tandy, Balamurali, & Livingston, 2010; Gravlee, 2009; Penner et al., 2012; Zuckerman et al., 2008). Studies of African Americans with AD and other dementias have found co-occurring medical conditions to be common (Bunn et al., 2014; Melis et al., 2013; Oosterveld et al., 2014), and these conditions are associated with worse cognitive performance (Doraiswamy, Leon, Cummings, Marin, & Neumann, 2002).

For instance, a study of a longitudinal, multiethnic community cohort concluded that the increased prevalence of Type 2 diabetes at baseline could explain a significant portion of the racial disparity in the prevalence of cognitive impairment and dementia among older adults (Noble, Manly, Schupf, Tang, & Luchsinger, 2012). The association between diabetes and cognitive decline is well established (Bangen et al., 2015; Luchsinger, 2012; Luchsinger et al., 2011; Mayeda et al., 2014; Palta et al., 2014). African Americans have a higher rate of Type 2 diabetes (Ferdinand & Nasser, 2015; Peek, Cargill, & Huang, 2007; Sundquist, Winkleby, & Pudaric, 2001), as well as of other chronic medical conditions that are associated with decreased cognitive performance (Gustafson, Rothenberg, Blennow, Steen, & Skoog, 2003; Ott et al., 1997; Reijmer et al., 2012; Seshadri et al., 2002; Skoog et al., 1996; Unverzagt et al., 2007; Whitmer, Sidney, Selby, Johnston, & Yaffe, 2005). Many cardiovascular conditions have an earlier age of onset among African Americans, yet they are often diagnosed at later stages of illness and treatment is often not equally as effective as that for White patients with similar severity of illness (Barnes & Bennett, 2014; Chui & Gatz, 2005; Cooper et al., 2010; Poon, Lal, Ford, & Braun, 2009). This has important implications for understanding cognitive performance in older African Americans.

Earlier age at onset of cardiovascular conditions, paired with racial inequities in treatment, may cause racial differences in burden of cerebrovascular disease among African Americans (Brickman et al., 2008; Reitz et al., 2009). Infarcts are present on structural MRI scans among 30% of African American and White older adults who do not self-report having a stroke (Reitz et al., 2009). Furthermore, the relationship of cerebrovascular

disease, such as white matter disease burden, may be more tightly coupled with poor cognitive test performance among African Americans than among Whites (Zahodne et al., 2015). Therefore, because of the disproportionate impact of cardiovascular and cerebrovascular disease on cognitive test performance among African Americans, examination of structural brain imaging should be a fundamental aspect of the neuropsychological evaluation.

Educational Experience

Significant gaps in quantity and quality of education are found between ethnic minorities and Whites (Aud, Fox, & KewalRamani, 2010; Jacobson, Olsen, Rice, Sweetland, & Ralph, 2001). Illiteracy rates in the United States are highest among people age 65 years and older, and the gap between Whites and African Americans is largest for this age group (Kirsch, Jungeblut, Jenkins, & Kolstad, 2002; Sudore et al., 2006). Attendance at segregated schools and segregated classrooms within integrated schools have been causally linked to disparities in health and cognitive outcomes (Walsemann & Bell, 2010; Walsemann, Gee, & Ro, 2013).

If years of education is a poor surrogate for educational experience among African Americans, this has particular relevance for neuropsychologists. Years of school is the variable used in many neuropsychological test norms to account for differences in educational experience among test takers, to improve specificity of measures among people with poor education, and to improve sensitivity among well-educated individuals. It is also common for researchers to use years of education as a covariate when comparing participants across race, in order to equate ethnic groups on years of education before interpreting neuropsychological test performance. Matching racial groups on quantity of formal education does not mean that the quality of education received by each racial group is comparable, nor does it mean that controlling for it allows for better inferences about the impact of race on cognition (Glymour & Manly, 2008; Kaufman, Cooper, & McGee, 1997; VanderWeele & Robinson, 2014).

Several researchers who have assessed school quality among older African Americans and Whites found that even when racial groups were matched on years of school, poor school quality was associated with lower scores on neuropsychological measures and that school quality helped to explain racial disparities in cognitive test performance (Fyffe et al., 2011; Manly, Jacobs, Touradji, Small, & Stern, 2002; O'Bryant, Schrimsher, & O'Jile, 2005; Ryan et al., 2005; Shadlen et al., 2006). Regional and neighborhood differences in educational quality across race, including level of segregation and racial disparities in school funding and term length, are linked to cognitive and cerebrovascular outcomes (Glymour, Avendaño, & Berkman, 2007; Glymour, Kawachi, Jencks, & Berkman, 2008; Liu, Glymour, Zahodne, Weiss, & Manly, 2015). Several studies have used single word reading recognition as a proxy for quality of education and found that this measure explains racial differences in cognition among people with moderate to severe acquired head injury, mild cognitive impairment (MCI), hypertension, all-cause dementia, and AD and among community-dwelling older adults free of neurological disease (Byrd, Touradji, Tang, & Manly, 2004; Manly, 2005, 2006; Manly, Byrd, Touradji, Sanchez, & Stern, 2004; Manly, Byrd, Touradji, & Stern, 2004; Shuttleworth-Edwards et al., 2004; Silverberg, Hanks, & Tompkins, 2013).

Studies have found an attenuating effect of early-life quality of education on risk for dementia and cognitive decline (Chin, Negash, Xie, Arnold, & Hamilton, 2012; Yaffe et al., 2013). For instance, in a direct test of the importance of early-life educational inequality on later life cognitive performance, researchers developed a measure of educational quality based on factor analytic methods, with White subjects clustering near the higher quality end of the scale, as expected (Sisco et al., 2014). After adjusting for early-life quality of education and adult reading level, differences in cognitive performance between African Americans and Whites were attenuated by 30%. Quality of schooling was a significant predictor of African American cognitive test performance, but not of White test performance. Although quality of education and reading level only partially accounted for racial disparities in cognitive testing, these results support the significant role of educational experiences in understanding racial disparities in cognitive aging.

Environmental Influences on Aging in African Americans

The effect of race on cognitive outcomes may be more appropriately explained by environmental factors (Acevedo-Garcia, Osypuk, McArdle, & Williams, 2008; Freedman & Woods, 2013; Hair, Hanson, Wolfe, & Pollak, 2015; Johnson, Schoeni, & Rogowski, 2012; Morenoff et al., 2007; Williams et al., 2003). Research in this area has suggested that race as a clinical and research variable is a poor proxy for underlying causal agents, specifically the accumulation of social disadvantage throughout the lifespan.

One approach to better understanding how social environment becomes embodied in cognition and illness is weathering (Geronimus, 1992). The concept of weathering proposes that exposure to everyday social disadvantage (including poverty, worse neighborhood characteristics, neurotoxic exposures, exposure to stressors, experiences of discrimination, and exposure to violence) accumulates over the life course and increases the vulnerability of disadvantaged groups to medical and psychological illnesses (Geronimus et al., 2015). Just as years of education may be a poor representation of quality of schooling among African Americans, chronological age may have an incommensurate relationship with biological aging between African Americans and Whites because of weathering.

Culturally Appropriate Work With Key Informants for Collateral Information

Collateral sources that can provide information about functional abilities and signs of subtle cognitive impairment among older adults are an essential component of reaching accurate diagnoses of MCI and dementia. However, informant interviews must be culturally appropriate, and whether commonly used questionnaires are adequately sensitive to cultural differences remains uncertain (Potter et al., 2009). Cultural and social differences, expectations, and information about aging and health and willingness to volunteer information in face of mistrust may decrease the likelihood that elderly African Americans are diagnosed as early in the disease course as Whites (Rovner, Casten, & Harris, 2013).

ASSESSMENT BEST PRACTICES

There are significant challenges for neuropsychologists in the accurate assessment of cognition and dementia among African American older adults, but there are also an increasing number of resources and a growing knowledge base from multiple successful studies. These data suggest several distinct recommendations when conducting cognitive assessment of African Americans.

Selection of appropriate cognitive measures and neuropsychological test batteries should include a review of test bias. Ideally, the properties of cognitive measures should be tested across racial groups using modern psychometric methods such as item response theory, differential item functioning, and invariance analysis with structural equation modeling. Concerns about construct validity across race and cultural equivalence of tests should be paired with evaluation of test bias, bearing in mind that both the tests and the outcomes may be biased by the same race-related factors and that, compared with Whites, noncognitive factors may differentially affect test performance among African Americans.

Selection of tests should also take into account whether neuropsychological test norms for African American older adults are available. Use of separate norms for African Americans is appropriate when (a) the tests have construct validity; (b) testing is for diagnostic purposes; (c) when the norms were developed with a population that included people similar to the examinees (including birth year); (d) when selection bias and residual confounding do not invalidate the representativeness of the normative sample; and (e) when sufficient evidence demonstrates that demographic adjustments improve diagnostic accuracy. If used properly, demographic adjustments improve specificity of neuropsychological measures. Local norms are best, but if these are not available, clinicians should know the source of the norms they are using and understand how differences in the normative sample (including but not limited to race) may affect the sensitivity and specificity of their measures.

Neuropsychological assessment of older African Americans requires a life course perspective (Glymour et al., 2008). Cognitive assessment of

older African Americans should include recognition and assessment of environmental exposures and the social and cultural context of early life, midlife, and later life. Researchers are beginning to understand more about the way in which these conditions relate to cognitive trajectory, and it is now clear that measurement of life course social, biological, medical, economic, and psychological factors should be an integral part of cognitive assessment of older African Americans. Consideration of only proximal factors, or only immediate risk factors, increases the risk of misinterpretation of neuropsychological test results. Older African Americans have survived a lifetime of exposures that are not randomly distributed across the population but aggregate among those who are most disadvantaged. Many of these exposures negatively affect cognitive aging and consideration of the relationship between early life conditions and cognitive function in specific domains, critical periods of influence, and valid measurement of these exposures should be a priority for neuropsychologists who are evaluating African American older adults (Glymour et al., 2008; Whalley, Dick, & McNeill, 2006).

Chronological age may not be an equivalent indicator of biological age across African Americans and Whites because of weathering, which is in turn associated with experiences of discrimination, economic inequities, neighborhood stressors, and other social factors. Closely tied to enactment of life course methods is an awareness of the critical importance of longitudinal neuropsychological data among African American older adults. Review of research in this area shows that cognitive change and cognitive trajectory among African Americans yields more revealing and replicable results and is more likely to shed light on pathways of disparities in dementia across race.

It is important to be aware of the differential impact of medical and psychological conditions among African American older adults. African American older adults are less likely to seek medical or psychiatric services and may receive less thorough care when they do (Snowden, 2012). The common co-occurrence of conditions such as diabetes and hypertension, which pose independent risks for cognitive impairment when untreated, must be considered. Because African Americans are also more likely to have an earlier age at onset for these conditions, the amount of time African American test takers have lived with these conditions is likely to be longer than that among Whites of the same age. Clinicians should consider that racial differences in presentation to memory clinics may be related to results that African Americans are more likely to be found to have mixed neuropathology on autopsy, whereas random autopsy series do not find higher rates of Alzheimer's pathology among African Americans (Sandberg, Stewart, Smialek, & Troncoso, 2001).

Educational quality, reading level, and numeracy are particularly relevant variables to be included for accurate assessment of dementia among older African Americans. Educational quality, measured using historical indicators or with reading level as a proxy, is a significant predictor of cognitive test performance, independent of years of education and other confounds. It is important to consider school quality together with number of years of school attained when interpreting test performance of African American older adults. Prior research has suggested that early-life educational quality may be a critical mediator of the pathway linking race to later-life cognitive decline and dementia (Manly, Byrd, Touradji, & Stern, 2004; Manly et al., 1999, 2002; Yaffe et al., 2013).

Culturally appropriate engagement and recruitment is necessary for both clinical work and research among African American older adults (McDougall, Simpson, & Friend, 2015). Community-based engagement that is genuine (not superficial) and that emphasizes well-planned and equal partnership and ownership of the endeavor has been the key to successful participation of representative older adults. This moves away from the traditional models of outreach and recruitment in which the barrier to participation among understudied groups is assumed to be lack of knowledge in the community. Relevant steps may include (a) hiring and training staff who are experts in culturally appropriate community engagement; (b) establishing planned partnerships with community service and religious organizations; (c) developing relationships with community social leaders; (d) budgeting time and resources for community engagement and exchange

of information; (e) gathering information about and providing resources to address potential barriers to participation; and (f) education of staff about culturally appropriate engagement (George et al., 2014; Katz, 2004).

Community engagement efforts with African American older adults can emphasize the crucial role of health equity, modifiable cardiovascular risk factors, and psychosocial sources of resilience in promoting brain health and preventing cognitive decline. The disproportionate burden of cognitive impairment and dementia in the African American community requires the field to focus on development and use of methodologically sound instruments, adherence to best practices during education and training for cognitive assessment, advocacy for adequate resources to engage and partner with the African American community, and a comprehensive scientific focus on factors that may reduce disparities in cognitive decline and improve response to interventions.

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